

1. An apparatus for measuring at least one of a speed and acceleration of a vehicle traveling on a vehicle path, the apparatus comprising:

a first radiation source that emits radiation arranged at a first side of the vehicle path;

5 a first reflector arranged on a second, opposite side of the vehicle path from said first radiation source that reflects radiation emitted from said first radiation source back towards the first side of the vehicle path;

10 a first detector arranged at the first side of the vehicle path that receives the reflected radiation from said first reflector and detects a presence and absence of the reflected radiation;

a second radiation source that emits radiation arranged at the first side of the vehicle path;

15 a second reflector arranged on the second, opposite side of the vehicle path from said second radiation source that reflects radiation emitted from said second radiation source back towards the first side of the vehicle path;

a second detector arranged at the second side of the vehicle path that receives the reflected radiation from said second reflector and detects a presence and absence of the reflected radiation; and

20 a controller operatively connected to said first and second detectors that calculates at least one of the speed and acceleration of the motor vehicle in response to said first and second detectors.

2. An apparatus according to claim 1, wherein said first radiation source and said first detector are located in a first sender/detector unit, and wherein said second radiation source and said second detector are located in a second sender/detector unit.

5 3. An apparatus according to claim 1, wherein said first reflector and second reflector comprise first and second retro-reflective matrix units, respectively.

4. An apparatus according to claim 2, further comprising a bar unit, wherein said first and second sender/detector units are each supported on said bar unit.

10 5. An apparatus according to claim 4, further comprising an adjustment mechanism on said bar unit to adjust the height and direction of the radiation emitted from said sender/detector units.

6. An apparatus according to claim 4, further comprising at least two bar units, each supporting at least a pair of said sender/detector units, and spaced apart
15 from each other at a desired interval.

7. An apparatus according to claim 4, further comprising at least two bar units, each supporting at least a pair of sender/detector units, and connected to each other end to end.

8. An apparatus according to claim 2, wherein said first and second
5 sender/detector units are each affixed into a permanent installation on the side of a roadway.

9. An apparatus according to claim 3, wherein said first and second reflectors are each affixed into a permanent installation on the side of a roadway.

10. An apparatus according to claim 8, wherein a plurality of pairs of first
10 and second sender/detector units are affixed into a permanent roadside installation spaced apart at desired intervals.

11. An apparatus according to claim 9, wherein a plurality of pairs of first and second reflectors are affixed into a permanent roadside installation spaced apart at desired intervals.

12. An apparatus according to claim 1, wherein each said radiation source
15 is a laser beam source.

13. An apparatus according to claim 1, wherein each said radiation source is a modulated laser beam source.

14. An apparatus according to claim 13, wherein the beam is modulated at a rate greater than approximately 20 kHz.

5 15. An apparatus according to claim 1, further comprising a tilt sensor that measures a tilt of the vehicle path relative to a level path, wherein said controller determines the specific power of the vehicle due to calculated acceleration and measured tilt.

10 16. An apparatus for measuring at least one of a speed and acceleration of a vehicle traveling on a vehicle path, the apparatus comprising:

first radiation means for emitting radiation arranged at a first side of the vehicle path;

first reflector means arranged on a second, opposite side of the vehicle path from said first radiation means for reflecting radiation emitted from said first radiation means back towards the first side of the vehicle path;

first detector means arranged at the first side of the vehicle path that receives the reflected radiation from said second reflector means for detecting a presence or absence of the reflected radiation;

second radiation means for emitting radiation arranged at the first side of the vehicle path;

second reflector means arranged on the second, opposite side of the vehicle path from said second radiation means for reflecting radiation emitted from said

5 second radiation means back towards the first side of the vehicle path;

second detector means arranged at the second side of the vehicle path that receives the reflected radiation from said second reflector means for detecting a presence or absence of the reflected radiation; and

calculating means operatively connected to said first and second detectors, for
10 calculating at least one of the speed and acceleration of the motor vehicle in response to said first and second detectors.

17. A method according to claim 16, wherein the first and second radiation and detector means are each affixed to a permanent installation on the side of a roadway.

15 18. A method according to claim 16, wherein the first and second reflector means are each affixed to a permanent installation on the side of a roadway.

19. A method for measuring at least one of a speed and acceleration of a vehicle traveling on a vehicle path, comprising the steps of:

emitting radiation from a first side of the vehicle path;

reflecting radiation emitted from said radiation emitting step at a second,
opposite side of the vehicle path back towards the first side of the vehicle path;

receiving at the first side of the vehicle path the reflected radiation from the
reflecting step;

- 5 detecting a presence or absence of the reflected radiation; and
 calculating at least one of the speed and acceleration of the motor vehicle in
response to the detecting step.

20. A method according to claim 19, further comprising the step of
adjusting the height and direction of the emitted radiation .

- 10 21. A method according to claim 19, wherein the emitting step includes
emitting a laser beam.

22. A method according to claim 19, wherein the emitting step comprises
the step of modulating radiation to emit a modulated beam.

23. A method according to claim 22, wherein the step of modulating the
15 beam includes modulating the beam at a rate between approximately 20 kHz and
approximately 200 kHz.

24. A method according to claim 19, wherein the reflecting step includes reflecting using a retro-reflective matrix unit.

25. A method according to claim 19, further comprising the steps of:

measuring a tilt of the vehicle path relative to a level path; and

5 determining the specific power of the vehicle due to the calculated acceleration based in part on the measured tilt.

26. An apparatus for measuring at least one of a speed and acceleration of a vehicle traveling on a vehicle path, comprising:

means for emitting radiation from a first side of the vehicle path;

10 means for reflecting radiation emitted from said radiation emitting step at a second, opposite side of the vehicle path back towards the first side of the vehicle path;

means for receiving at the first side of the vehicle path the reflected radiation from the reflecting step;

15 means for detecting a presence or absence of the reflected radiation; and

means for calculating at least one of the speed and acceleration of the motor vehicle in response to the detecting step.

27. An apparatus according to claim 26, further comprising:

means for measuring a tilt of the vehicle path relative to a level path; and

means for determining the specific power of the vehicle due to the
calculated acceleration based in part on the measured tilt.